

REPORT OF THE 2006 MOFEP ANNUAL MEETING

David Gwaze and Julie Fleming

The 2006 Missouri Ozark Forest Ecosystem Project (MOFEP) annual meeting was held on November 30, 2006 at the Missouri Department of Conservation Central Office in Jefferson City, Missouri.

OBJECTIVES

The overall objectives of this meeting were to exchange information on data integration of MOFEP studies and to discuss future direction of integration. Three MOFEP collaborators were asked to present their experiences with data integration so that other principal investigators (PIs) could learn from their experience. The steering committee expected that the presentations and discussions would assist the steering committee to plan for integration as we approach the next entry harvest.

PARTICIPANTS

Sixteen people participated in the meeting, including scientists, administrators, resource managers from Central Methodist University, Missouri Department of Conservation, University of Oklahoma and University of Missouri-Columbia. The attendance was low this year due to severe weather conditions.

PRESENTATIONS AND DISCUSSIONS

Steve Sheriff, moderator for the opening session on integration, welcomed participants and thanked them for coming despite the bad weather.

Welcome remarks

David Gwaze, MOFEP Coordinator, gave an overview of the meeting's purpose, agenda and background to integration. Integration is critical for achieving greater understanding of ecological systems and processes. Thus, the question is not whether we need to integrate data from different studies, but how best to achieve useable results through integration. Key questions that need addressing are:

- 1) What questions are we trying to address through integration of data from MOFEP studies?
- 2) What studies can be integrated to address those questions?
- 3) How do we do this integration?

Discussions surrounding integration are not new in MOFEP, but have been going on since MOFEP started. For example, the 1997 and 2002 MOFEP Symposium Proceedings have papers dealing with integration; 2004 and 2005 annual meetings discussed the need for further integration; and the current and previous strategic plans both highlight integration as a priority. In addition, Wendy Gram, John Kabrick, Mike Wallendorf ,

Chong He and others have integrated and synthesized data from a variety MOFEP studies. An issue highlighted by these efforts has been that integration was not planned in detail before pre-treatment data collection started. The need for integration was only discussed after much of the data collection was in progress, making changes in study designs difficult to accommodate integration. Therefore, this meeting was timely because it allows MOFEP PIs to plan for integration prior to the next entry harvest.

David indicated that Wendy, Mike and Chong would share with other MOFEP PIs some of their experiences that they have encountered while attempting to integrate data from a variety of MOFEP studies. The group discussion following the presentations would explore possible answers to the following questions: 1) why do we need integration, 2) what studies need integrating and 3) how the integration of the studies identified will be best achieved?

Integration

Wendy Gram's Presentation:

From 1997 to 1999, Wendy was a full-time post doc at the University of Missouri-St. Louis, working on integration and metadata development. She worked on data from the physical landscape, forest structure, woody plant genotypes, woody plant population density, birds, mammals, amphibians and reptiles, and oak herbivores studies

Topics of study included: 1) relationships between population density and genotypic composition, and between environmental and genetic heterogeneity; 2) A meta analysis project including oak herbivores, birds, amphibians, reptiles and mammals, which created ecological groups of similar species, looked at changes in density and relative abundance, and considered effects of even and uneven-aged management; and 3) Interactions between avian and insect herbivore communities. (Wendy's papers from these efforts are posted on the MOFEP website.)

The potential for integration will continue to grow as MOFEP progresses. Some data from the first entry (pre-treatment) could be integrated, but other data were problematic. Questions were not defined in advance, which made integration difficult in some cases. Wendy emphasized that we need to determine the priority integration questions.

Challenges for integration:

1. **Data** (management; metadata; availability; expertise) – needs to be communicated between PI's who collect data that will be integrated; design relative to integration questions needs to be accommodated; spatially-referencing issues for the data need to be addressed, such as where are the 'most recent and best' copies of MOFEP GIS data for each study? Groups collecting data should use the same spatial references as the 'master' MOFEP GIS data.
2. **Scale of interest** (temporal; spatial; ecological) – needs to be defined for the priority integration projects. For example, data needed for addressing an

integration question established for a short-term result after a harvest entry into the MOFEP sites may require more intensive spatially and temporally sampled data than an integration study that focuses on long-term results after a rotation or two.

3. **Time and priorities** (collaboration takes more time than individual projects; integration may not be a priority of key PIs; proximity to collaborators; compatible availability of collaborators) – need to be established for each major integration study.
4. **Personnel/Expertise** (plan integration before data are collected for individual projects) – people with the correct skills and understanding need to be involved in the integration projects. The PIs who know the most about the data being integrated must be involved. However, people with specialized skills, such as ecological modeling or spatial-temporal statistical analysis are important.
5. **Funding** of priority integration studies will be a critical need to ensure that the study is completed.
6. **Future of integration**
 - a. Prioritize integration research questions
 - b. Develop working groups to plan and conduct integration studies
 - c. Evaluate current data collection plans and revise to include appropriate data for integration
 - d. Make accurate data available in a timely manner
 - e. Promote short-term studies within the MOFEP framework that focus on causes of observed patterns

Mike Wallendorf's Presentation:

MOFEP PIs currently integrate soil and silviculture information for examining biotic components of MOFEP. They use these auxiliary data with spatial location of observations to help them stratify by ELT or disturbance regimes. At the observational scale within each site, MOFEP is limited by the sample design. At the local scale, samples for each study are far enough apart that correlative inferences are limited. In hindsight, randomly chosen common sample points would have allowed sample point correlation of responses between studies, use of covariates to reduce error (improve power), and conjecture on intermediate mechanisms for faunal responses. Limitations to integration of current data are functions of the scale of response for each variable, scale of measurement (sampling fraction), and position of measurement. In the analysis of local scale response of forest birds to clear cut, Mike and his collaborators used inferences drawn by other investigators about local scale response by trees and ground flora to characterize mechanisms for bird response. For future work, Mike recommends use of prior hypotheses about interdisciplinary variables and sample designs for coordinated use of those other data.

Chong He's Presentation:

Chong reviewed the experiment design of MOFEP and discussed the relationship between the primary and secondary objectives. An enormous amount of data are collected from MOFEP study sites to answer the primary or secondary research questions. However, much of these data are collected at different spatial and time scales, because the focus and species of the individual studies are different. This generates a big challenge for an integration study. Chong summarized different statistical methods that might be used in this process for MOFEP. These methods included traditional statistical methods, spatial modeling, and Bayesian spatial modeling. She provided advantages and disadvantages of each method. Finally, she presented some recent results on site index and herbaceous data analysis using a Bayesian spatial modeling approach, and discussed the possible integration with other data sets within these analyses. According to Chong, other data that may be useful for integration includes other vegetation data, bird data, and weather data.

Difficulties for integration include:

1. Sampling at different scales and locations
2. Different comparisons
3. Different investigators

Integration Discussion:

The discussion on integration was moderated by Wendy Gram. The participants raised the following questions and suggested the following solutions to those questions:

Question: What are the integration questions?

Suggested solutions:

- We have to consider whether the answers to the questions we ask will make a difference to managers.
- We should consider broad questions like 'how does site index affect bird reproduction and species composition?'
- It is hard to detect broad ecological relationships. It might be better to look at direct and indirect effects of different management treatments.

Question: Who will define the questions?

Suggested solutions:

- Managers could give input regarding what information they need to direct their management. The manager's priorities can help direct the questions. Managers

have to consider how readily PIs can change their protocols, and what effects changes will have on the overall project.

- Each primary investigator must think about “their” study’s questions. What mechanisms and components will affect the answers to these questions, and what other studies are looking at those mechanisms and components?

Question: What sampling design changes are needed to ensure integration?

Suggested solutions:

- PIs do not need additional plots. They can just adjust where the data are being collected, so it is more ‘integratable’. For example, we could put herp arrays where ground flora data are being collected. But, this solution must be evaluated closely as to the impact on the data and inferences from the data already collected.
- PIs may need to add more plots. For example, add more ground flora plots to supplement other permanent plot data. We might not need that many more plots to get the data that are needed. However, we need to define the questions first, then look at the study designs to see what can be adjusted to answer the questions.
- The important variables to monitor a given species group need to be narrowed down first. For example, canopy cover influences ground flora, which affects herps. So we should look at canopy cover at the herp arrays.
- Literature review could help determine what variables we need to focus on.
- We must consider integration and sampling over time. If the bird study continues longer than the vegetation monitoring, then what do we have to tie bird species composition and abundance when vegetation data are not collected? We should also consider temporal correlations – can we balance the sampling framework to make budget/staff time allocations easier?
- Listing all of the studies may make it easier to see where the integration parameters are, and where the gaps are. In order to fill the gaps we can then adjust sampling schedules or sample locations.
- Detecting impacts of management on forest birds was only possible on a stand level after the first entry. In order to facilitate integration, other PIs could examine data at the stand level in their studies.

Question: How will we proceed with integration in the future?

Suggested solutions:

- Assign people to be responsible for integration (e.g. a working group).

- PIs must agree to integrate data as a priority, not only focus on their own research projects.
- We need either a facilitator to coordinate everything, or someone who will do the integration. The MOFEP coordinator could act as the facilitator or MDC could hire someone to do the integration.
- Make integration part of the MDC Resource Science Division review process. The project review process would address “How is your study going to be integrated with the other MOFEP data?”
- The steering committee is the overall “coordinator” to ensure synchronization of projects. Thus, the committee must take a lead in facilitating integration. The committee should develop the integration questions. The committee could form an “integration subcommittee” that includes people who are not on the steering committee to aid in developing the integration questions. Making the steering committee take a leading role in facilitating integration will ensure continuity and institutional memory. Once the ‘questions’ are determined, they need to be added to the Strategic Plan.

MOFEP Strategic Plan

Mike Roell moderated this session and the rest of the sessions. David Gwaze gave an update on the 5-year MOFEP strategic plan. The plan identifies the priority informational needs for MOFEP.

Core projects and ongoing projects are identified in the plan. Resource Science Division Administrators and PIs had opportunity to comment on the strategic plan. The revised plan is available on the MOFEP website. David stressed that the strategic plan is a working document that will be modified in the future as we continue to discuss the direction of MOFEP and revise the MOFEP conceptual models.

In addition to the strategic plan, documents on lessons learned and the MOFEP bibliography were compiled. These three documents were sent to MDC leadership. All the documents were well received. The most important outcome of the strategic plan is that it has been used by the Resource Science Division Administrator to justify two positions for Plant Community Ecologist who will oversee MOFEP Botany and soft mast projects, and Resource Assistant to replace Mark Johanson. The new MOFEP Botanist is Susan Farrington. Interviews for the Resource Assistant position were held and a candidate was selected, but we were not able to fill the position due to MDC budget considerations. The position is likely to be filled next year, but new interviews may be required.

Following the strategic plan, the Steering Committee, ranked FY08 one-page MOFEP proposals. The seven highest ranking ones were developed as full budget proposals for review. These seven proposals have been reviewed.

In the future, the MOFEP steering committee intends to sell the plan and MOFEP to the Directorate and Commissioners. The MOFEP steering committee proposes to have a tour of MOFEP sites for the Commissioners and Directorate in FY07. This tour will be designed to sensitize the policy makers about MOFEP.

FY08 Proposal Updates

The presentations on MOFEP FY08 proposals were supposed to have been updated during this meeting. It was expected that each PI was to present comments concerning questions they received during their proposal reviews. Seven new proposals were to be presented: birds, herps and small mammals, armillaria, carbon flux, nutrient cycling and hard mast. However, due to the bad weather only two proposals were presented: the forest interior birds proposal presented by Rick Clawson and the hard mast proposal presented by Carrie Steen.

Outside Funding

Kit Freudenberg presented an overview of how to go about obtaining outside funding. She encouraged MOFEP PIs to keep her informed about their projects so she can watch for opportunities. She also announced that there will be a grant-writing workshop at the MNRC, and encouraged everyone to attend.

Next MOFEP Symposium

Questions considered were:

- Do we need a symposium?
- Should the symposium be held in 2008 or 2009?
- Where should the symposium be held?

Participants agreed that a symposium on MOFEP was required in order to disseminate up-to-date findings on MOFEP.

It was suggested that a symposium (or workshop) should be held in Missouri. This meeting should be specifically targeted at resource managers, and would focus on lessons learned from MOFEP. It was suggested that this meeting should be held in conjunction with the MNRC in 2009. Having the meeting in conjunction with the MNRC would ensure broad attendance by resource managers. However, the inability to visit the sites (long distance and bad weather) and the fact that other workshops at MNRC might prevent wildlife and fisheries managers from attending the MOFEP meeting were viewed as potential drawbacks of holding the meeting during the MNRC. Holding the meeting in the Ozarks during the warmer season should be considered.

It was recommended that another MOFEP symposium should be held in conjunction with the Ecological Society of America meeting in Wisconsin in 2008, and this meeting could focus on integration. Holding the MOFEP meeting in conjunction with the ESA meeting would provide wide exposure for MOFEP.

It was agreed that the MOFEP steering committee should plan for either two symposia or symposium and workshop.

MDC Budget Considerations

Mike Roell indicated that the current FTE cap and revenues being less than projected have put constraints on the number of FY08 projects that can be funded.

Tom Nichols showed slides summarizing FY03-FY07 budget allocations; he compared the amount spent on MOFEP vs. other projects over the years.

Concluding Remarks

The meeting provided an opportunity for MOFEP investigators who have attempted integration to share their experiences with the other MOFEP PIs, and help the MOFEP steering committee in planning for further integration studies.

What was clear from the annual meeting was that the issue of integration is complex, and cannot be resolved in one day. It requires a much longer time frame, and requires all stakeholders to be involved. However, we made a good start in mapping out a strategy on what needs to be done to ensure we achieve integration of data that will be meaningful to managers. It was agreed that the first thing that needs to be done is to identify the integration questions. Unless these questions are clearly defined and agreed upon by resource managers integration will remain illusive. It was agreed that the MOFEP steering committee should make integration a priority in their future discussions. The MOFEP steering committee was tasked with the responsibility of developing the integration questions. Given that the expertise on integration may reside outside the MOFEP steering committee, PIs should avail themselves to helping the steering committee in this endeavor. Developing the integration questions will require an iterative process between the MOFEP steering committee, with advice from PIs, and the resource managers to ensure that the integration questions address the needs of the managers. After developing the integration questions, studies that can contribute to addressing the questions will be identified and sampling designs to address the questions will be reviewed.

Thanks are due to the presenters, facilitators, participants, and the administrative staff at the MDC Central Office for helping to make the meeting possible.